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BUSINESS PLANNING FOR CONSERVATION FARMING SYSTEMS

Presented to the 1985 Crops & Soils Workshop, University of Saskatchewan, Saskatoon, Saskatchewan.

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SUMMARY

This study was supported by Farmwest Management Ltd. and by a grant from the Saskatchewan Agricultural Research Fund to the author.

The objective was to utilize computerized business simulation techniques to examine the financial impact of changeover to crop intensive conservation farming systems in the Dark Brown soil zone.

The market variables studied were market price (winter wheat at $4.20 - 5.20/bu), and input costs (inflation at 5 - 8% and interest rates at 12 - 17%).

The uncertainty associated with these market factors over these ranges was found to severely restrict the potential for making the changeover financially feasible on the case farm studied.

Some rules of thumb emerged from the analysis regarding conditions where changeover to continuous crop winter wheat can be financially feasible (given an average yield of 30 - 31 bu/ac).

For example, the analysis suggests that a feasible Farm Business Plan for the full conservation Cropping System utilizing winter wheat will not be possible if any two of the following factors describe the individual farm situation:

- less than 2,000 acres good land/family;
- debt/equity ratio over 20%;
- yield X price expectation less than $140/ac;
- the banker(s) are not knowledgeable about conservation concerns and new cropping technology.

This study, although limited in scope, raises important questions about research priorities.

For many years, the focus of research has been on identifying ways to improve production. However, practically no research has been conducted into how to achieve financially successful adoption of the new technology on individual farms. This has resulted in an unfortunate combination which does not serve researchers or farmers well. A better balance is needed.

1. INTRODUCTION

Farm-West Management Consulting Agrologists work with many farm clients on a 1:1 basis, advising on a wide range of farm business problems. The experience of the FarmWest Consulting Agrologists over the past few years suggests that there is great potential but also serious financial risks associated with uptake of the new water efficient conservation cropping technology for most farm situations, outside of the Black Soil Zone.

Farm-West has examined some market-related risk factors with respect to their financial impact on farms where the manager wishes to move into the new crop intensive technology.

This present analysis is facilitated through the use of a Cash-Flow Analyzer Program which FarmWest has had under development for several years. The initial use of the Cash-Flow Analyzer occurred as part of the farm management analysis for the Farm Energy Management Program (Sask. Research Council) and has been continued with the aid of a grant from the Saskatchewan Agricultural Research Fund.*

The Cash-Flow Analyzer enables the decision maker (and researchers & extension workers) to understand the impact of unexpected "downside" market factors such as market price, quotas, inflation and interest rates.

The "Business Plan" developed by the farm decision maker must take the "downside" cash flow factors into account, because the required financial arrangements must be put in place in the planning stage. Using cash flow analysis to develop a "Business Plan" provides the management framework to decide whether uptake of new technology can be financially successful on the individual farm.

Several cases have been studied in the Dark Brown Soil Zone using the cash flow business planning approach. One representative case is presented in this paper. The change-over to a minimum tillage, water efficient, energy efficient, soil conserving system is shown to be feasible for the case farm analyzed, although downside market factors are shown to have a severe impact on farm finances.

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* The SARF grant was awarded to the author.

A Users Manual and Spec for the Program has been prepared for FarmWest Management by Rhonda Lindskog, B. Comm., Computer Systems Analyst.

2. A CASE FARM

A detailed Business Plan has been prepared for this case farm. The Plan details the rotation system, machinery and equipment, and management information required. It also outlines how much operating credit will be needed. The Plan also shows what the farm will do if expected revenues do not materialize, that is, how the farm family will cover a deficit on the downside. In summary, the Business Plan shows where them money will go if there is an operating surplus and where the money will come from to cover a loss.

The production and cost figures used are based on the client's own records, and the best projections which can be made given information about cropping systems and yield potential for this individual.

The relevant case farm characteristic's are summarized below:

- 2,000 acres Rosetown, and Elstow Clay and Clay loan
- total value of farm assets: $1.5 million
- total debt as % of asset value: 17%
- machinery and equipment investment: $125/acre
- new debt associated with changeover: $30,000
- long term debt (15 years) as % of total debt: 86%
- family of 5, 3 children in public and high school, family expenditures $4,000 - $5,000 per family member/year
- area average 27 cm rainfall, 20 cm during growing season.

The new cropping system for analysis can be described as follows:

- 2,000 acres of winter wheat on stubble
- no summerfallow
- minimum till seeding with air seeder with dual air system and dual banding/seeding knives
- custom straight combining of all acreage
- natural air drying capacity for 50% of expected average crop

- 1/3 of crop sprayed with grassy weed and broadleaf chemical, 2/3 sprayed with broadleaf only
- N fertilizer applied at 1.7 x expected crop uptake
- P fertilizer applied at 20 lb. P_2O_5/acre
- target winter wheat yield based on 25 cm water use at W.U.E. of 80 kg/ha/cm (about 30-31 bu/acre)
- See Table 1 for projected costs

For the purposes of this paper, a simplified Business Plan Analysis is presented. The downside factors examined are limited to: 1) Grain prices (output markets), and 2) Inflation and interest rates (input markets).

TABLE 1: 1985 COST PROJECTION

	Per Acre Crop	Total Farm
1. Cash Outlays for Operating		
- Nitrogen	$ 19.00	$ 38,000
- Phosphorous	6.00	12,000
- Chemicals	9.00	18,000
- Fuel	5.00	10,000
- Repairs	5.00	10,000
- Insurance	5.50	11,000
- RM Taxes	3.00	6,000
- Other operating	10.25	20,500
- Custom combining	16.00	32,000
Subtotal	$ 78.75	$157,500
2. Other Cash Outlays		
- Debt service	15.50	31,000
- Family living	11.00	22,000
Subtotal	$ 26.50	$ 53,000
3. Total Cash Outlays	$105.25	$210,500.

Note: The cash outlays identified above do not include any expenditures for replacement of depreciable property (machinery, equipment, buildings, yard improvements, etc.) and do not include cash outlays for income tax.

3. IMPORTANT MARKET FACTORS

Downside market risks can be summarized as follows:

1) Costs may increase faster than expected, and

2) Grain prices and movement may not keep up with rising costs.

For a good Business Plan projection, present cost levels need to be adjusted to account for inflation over the length of the planning period.

To illustrate the importance of this factor, consider the following example, in Table 2.

TABLE 2: EFFECT OF INFLATION ON COSTS

		COSTS PROJECTED FOR 5 YEAR BUSINESS PLAN	
	COSTS NOW	AT END OF 5 YEARS	
		5% Inflation	8% Inflation
Fertilizer	$ 25.00/crop acre	$31.75	$37.50
Living	$22,000.00/year	28,000	33,000
Debt Service	$31,000.00/year	31,000	40,000*

*Current interest rates (12%) are currently linked to 5% inflation, but higher rates (say 17%) would be more likely to be associated with 8% inflation.

A second market factor is associated with the revenue side of the Business Plan. Prices are always hard to predict because of variation in supply from year to year. But another source of price uncertainty is particularly distressing. International currency relationships have a strong influence on domestic price levels and on the volume of exports.

To illustrate this point, consider Table 3.

TABLE 3: EXCHANGE RATES AND REAL PRICES

USA $ increased in value relative to importers currency		Real Price Trend for Wheat Importers (1)
1970-80:	2X	-23%
1980-83:	5X	+34%
1984 :	Even more	Away up*

*Since 1980, prices to N. American farmers have gone down eventhough the real price paid by importers in their own currency has gone up. Recent declining prices to North American famers are closely related to changes in currency prices. Importers are reluctant to purchase high volumes because of the demand effects associated with higher real prices in their own currencies.

(1) Adapted from J. Groenewegen, in CDA, MARKET COMMENTARY, Dec., 1984.

This example serves to illustrate the great uncertainties in terms of markets and real prices received on the farm measured in our domestic currency.

The analysis following illustrates the effect these input and output market factors can have on the feasibility of the Business Plan.

4. 5 YEAR BUSINESS PLAN CASH FLOW SUMMARY

The market factors considered in this section are input cost and market price.

The cost scenarios are:

1) 5%/yr inflation over 5 years, 12% interest (1984)

2) 8%/yr inflation over 5 years, 17% interest

The market price scenarios are:

1) 5.30/bu

2) 4.80/bu (1984)

3) 4.40/bu

The Cash-Flow Analyzer Program calculates the surplus (or a deficit = new debt required) to meet operating costs, debt service and family living. A "surplus" is available to cover depreciation or invest in new machinery, equipment or buildings, and to pay income tax. A cash "deficit" means that there was not enough cash to cover operating costs, debt service and family living.

Reference to Figure 1 shows that the system is very sensitive to price. At $4.80/bu the surplus available over 5 years is $204,000, or about $41,000 per year. To maintain the age of the machinery and equipment, re-investment of at least $25,000/year (or a rock bottom minimum of 10% x $250,000 in investment) is required. This leaves about $16,000/year for new investment and income tax.

5 YEAR CASH FLOW SUMMARY

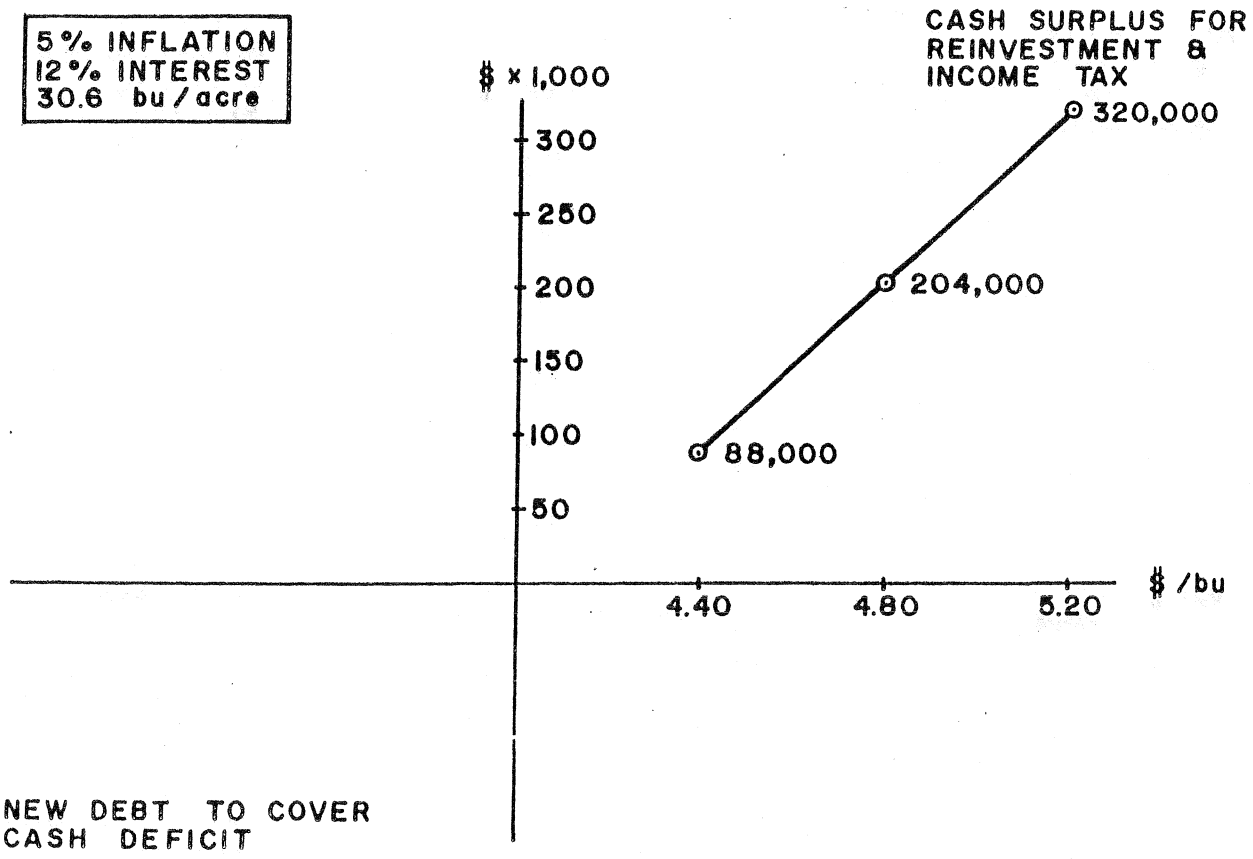

Figure 1. 5 Year Cash Flow Based On Expected Inflation and Interest Rates.

5 YEAR CASH FLOW SUMMARY

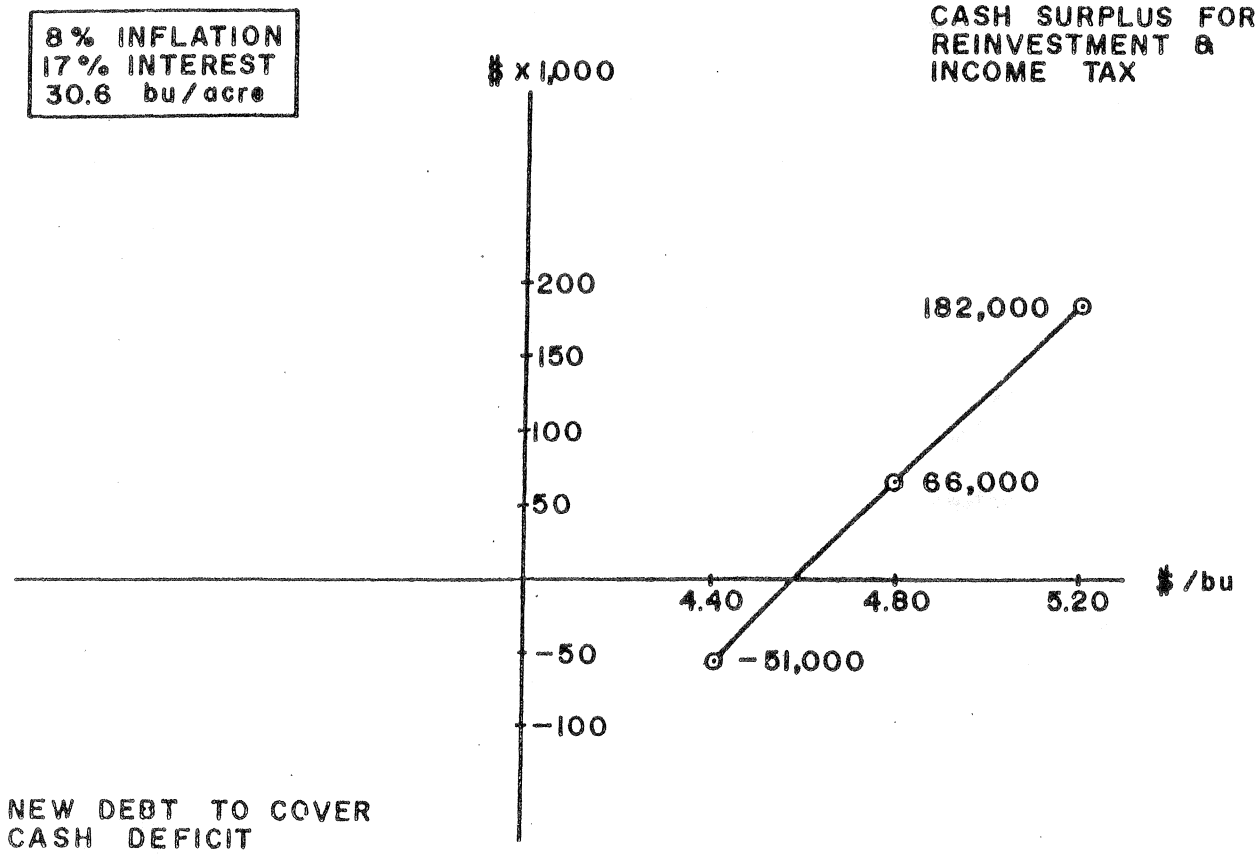

FIGURE 2: 5 YEAR CASH FLOW BASED ON DOWNSIDE INFLATION AND INTEREST RATES

Therefore, any surplus less than $204,000 over 5 years will require short term machinery loans and higher cash outlays. This means that any price under $4.80 presents some real financial difficulties for the Business Plan.

Reference to Figure 2 reveals that at $4.80/bu, none of the price combinations generate the required level of surplus over the period of the Business Plan. At prices in the area of $4.55/bu, revenues are not sufficient to cover operating costs, debt service and family living, and there are no funds available to replace machinery and equipment. This demonstrates the financial inpact of price changes in the farm input market. See Table 4.

TABLE 4: INFLATION AND CASH OUTLAYS

	Costs Now in Year 0 (1984) Expect 18-40bu/ac	Analyzer Run 5% infl.12% int. $\bar{x}$ = 30.6bu/ac	Analyzer Run 8% infl.12% int. $\bar{x}$ = 30.6bu/ac
	Average Cash Outlays Per Crop Acre/Year of Plan		
Fertilizer	$25.00	$29.93	$32.62
Chemiclas	9.00	10.23	11.16
Fuel, Repairs	10.00	11.48	12.60
Ins., RM tax	8.50	9.69	10.54
Other operating	10.25	11.69	12.71
Cust. Combining	16.00	18.24	19.84
Subtotal	$78.75	$91.26	$99.47
Debt Service	15.50	15.50	19.95
Family Living	11.00	12.50	13.65
Subtotal	$26.50	$28.00	$33.60
Total Cash Outlay	$105.25	$119.26	$133.07
As % of Year 0	100%	113%	127%
Yield equivalent at $4.80/bu	21.9bu	24.8bu	27.7bu

5. FINANCIAL IMPACT OF DOWNSIDE MARKET FACTORS

TABLE 5: INFLUENCE OF MARKET FACTORS ON CASH FLOW AT EXPECTED AVERAGE YIELD.

A summary of the information presented in Figures 1 & 2 is presented in Table 5.

Note that the difference between the expected downside market scenario is $255,000 over a 5 year period.

INFLUENCE OF MARKET FACTORS
ON CASH FLOW AT EXPECTED AVERAGE YIELD

GRAIN PRICE	INPUT COSTS	
	EXPECTED	DOWN
EXPECTED $4.80/BU	$ + 204,000	$ + 6
DOWNSIDE $4.40/BU	+ 88,000	- 5

$ + = CASH SURPLUS OVER 5 YEAR PERIOD

$ - = CASH DEFICIT OVER 5 YEAR PERIOD

TABLE 6: LIMIT REACHED ON LINE OF OPERATING CREDIT AT EXPECTED AVERAGE YIELD.

An examination of individual years within the 5 year period reveals the requirements for operating credit. Even under the expected 5 year scenario, year to year variations require $75,000 in line of credit. On the downside, $136,000 is required.

LIMIT REACHED ON LINE OF OPERATING CREDIT
AT EXPECTED AVERAGE YIELD

GRAIN PRICE	INPUT COSTS	
	EXPECTED	DOWNS
EXPECTED $4.80/BU	$ - 75,000	$ - 10
DOWNSIDE $4.40/BU	- 88,000	- 13

TABLE 7: CREDIT REQUIREMENTS ASSOCIATED WITH EXPECTED MARKETS.

The total credit requirements are summarized for the expected market scenario in Table 7. Note that income tax and machinery replacement is paid out of cash, and $39,000 is available for new investment or saving.

CREDIT REQUIREMENTS ASSOCIATED WITH EXPECTED MARKETS

1.	AUTHORIZED LINE OF CREDIT	$ 75,000
2.	CASH SURPLUS AT END OF 5 YEARS	204,000
	LESS ESTIMATE OF INCOME TAX	40,000
	BALANCE OF CASH SURPLUS AVAILABLE FOR RE-INVESTMENT	164,000
3.	RE-INVESTMENT IN MACHINERY AND EQUIPMENT	125,000
	ACTUAL CASH BALANCE	39,000

TABLE 8: CREDIT REQUIREMENTS ASSOCIATED WITH DOWNSIDE MARKETS.

The total credit requirements for the downside markets are given in Table 8. Note that the line of credit will end at $51,000 owing, and no machinery replacement can take place without additional new debt.

The total new debt required is $176,000, in order to term out the line of credit balance owing, and to cover replacement od depreciable property.

CREDIT REQUIREMENTS ASSOCIATED WITH DOWNSIDE MARKETS

1.	AUTHORIZED LINE OF CREDIT	$136,000
2.	LINE OF CREDIT BALANCE AT END OF 5 YEARS	51,000
3.	NEW LOAN REQUIRED TO REPLACE MACHINERY	125,000

TOTAL NEW CREDIT REQUIRED $176,000 (2. + 3.)

6. FINANCIAL SUMMARY FOR THE BANKER

The Business Plan shows a feasible enterprise plan based on expected market factors. Under this set of price and cost combinations for this Case Farm, the conservation farming system is expected to have adequate cash flow.

However, one requirement of the Business Plan is that the financial arrangements necessary to cover downside factors must be made at the outset. Therefore, the banker will have to agree in writing that the total credit package will be available to cover the downside eventualities. Without this assurance in writing, the Business Plan would not be feasible for this case farm.

BUSINESS PLAN SUMMARY FOR BANKER

		EXPECTED	DOWNSIDE
1.	AUTHORIZED LINE OF CREDIT	$ 75,000	$136,000
2.	LINE OF CREDIT BAL. YEAR 5	Ø	51,000
3.	CASH SURPLUS BAL. YEAR 5	204,000	(51,000)
	LESS INCOME TAX	40,000	Ø
	BALANCE FOR RE-INVESTMENT	164,000	Ø
4.	RE-INVESTMENT IN MACHINERY AND EQUIPMENT	125,000	125,000
5.	CASH ON HAND AFTER INCOME TAX AND MACHINERY REPLACEMENT	39,000	(176,000)
6.	NEW LOAN REQUIRED		
	CAPITALIZE 4C BAL	Ø	51,000
	MACHINERY LOANS	Ø	125,000
	TOTAL NEW LOAN	Ø	$176,000

Many bankers would be reluctant to give these assurances. However, the Plan is not complete without the necessary pre-authorized credit which could well be required to keep the farm afloat and the long-term conservation farming plan intact.

One troublesome feature for the banker is that the new credit which he is asked to authorize ($176,000) would almost double the total debt of the farm. Many conservative bankers will understandably be reluctant to assist a farmer on a Business Plan which could nearly double the farm debt in only 5 years. An intelligent banker would question whether the continued operation of the farm would be possible after year 5 given the downside scenario. The accumulated interest charges and the higher debt structure could easily add $.50 per bushel to future production costs after year 5. In reality, should the downside market factors materialize, most bankers (and Consulting Agrologists) would ask whether the experiment with "conservation farming" should be over for this case farm at the end of year 5.

Nevertheless, the Plan as outlined would be possible given the pre-authorized credit and the individual farmer only needs "cast iron guts", and the ongoing services of a competant Consulting Agrologist, to proceed.

(Note: Although for this paper the focus is on uncertainty due to market factors, variation within the yield distribution of 18-40 has been taken into account. The simulation run used for this exposition has an $\bar{x}$ = 30.6 bu/acre and an average annual variance of 6-7 bu/acre. In reality, the farm manager and the banker will also be interested in knowing the effect of an average yield lower than expected over the Business Plan period. Further analysis shows that for each 1 bu lost from average yield, about $43,000 in net cash flow is lost over a 5 year period. Therefore, an actual average of 28 bu/acre over 5 years would result in about $114,000 less cash over 5 years. This would wipe out the residual and require about $100,000 in new debt under the expected market scenario and increase the new debt from $176,000 to $290,000 under the downside market scenario.)

7. AN ADDITIONAL NOTE CONCERNING QUOTAS

In order to sell the expected production through the Canadian Wheat Board (as projected in this Business Plan), the quota would have to average about 23 bu/acre over the period. For the cropping system under study, it is very important to turn current production into current revenue, and this might require the use of some other farm's unused quota, or the outright sale of grain to some other farmer.

The analysis presented above demonstrates that if the farmer has to discount the price (say from $4.80 to $4.40) in order to sell the grain locally, this will have a very adverse impact on the financial performance of the plan (see Figure 1).

On the other hand, if the farmer decides to store grain (say 20,000 bu) in expectation of a poor crop or better quotas in the following year, the pre-authorized lines of credit identified in Tables 6, 7, 8, and 9 would be about $100,000 too low. This means that if storage is anticipated, the pre-authorized credit would have to be increased by about $100,000.

As a final consideration, the quota problem can be a most difficult one for the Business Plan. For this Case Farm, the farmer's expectation for available winter wheat quotas has to be such that he believes he will be able to see the farms production through the Canadian Wheat Board. Without this expectation, the farmer will not have a feasible business plan in this case.

In reality, the consideration of quotas brings the farmer and banker much closer to the real world expectations than suggested by the simplified analysis in Figures 1 and 2, and Tables 6-10. In fact, the institutional uncertainty surrounding C.W.B. quota policy is at best as significant as price uncertainty and is therefore a most distressing factor for management decisions for changeover to high input/high output/conservation cropping systems.

8. CONCLUSIONS AND RECOMMENDATIONS FOR THE CASE FARM

The changeover from a tillage intensive low input system to a crop intensive minimum tillage system with maximum water use efficiency, is feasible for this farm based on the expectations stated, and based on the adequate resources and good debt equity ratio available from the start.

Based on an average yield of 30.6 bu/ac, and $4.80/bu, the Business Plan projects revenues sufficient to pay all operating costs, debt service, family living, income tax, and to replace machinery and equipment out of cash on hand.

However, before undertaking the changeover, the farmer and banker must set up the pre-authorized credit required to finance the plan should downside market scenario develop. This amounts to $176,000 in new debt by the end of the Business Plan period.

Before finally declaring the Plan financially feasible, the farmer will have to be confident of free access to extra quota acres, unless the quota expectation is in the range of 23 bu/acre per year. Because of limited experience with winter wheat volumes there is no firm ground upon which to base such an expectation. Gaining access to markets by discounting to neighbors with quota is not acceptable unless prices are well over $5/bu and would not be consistent with a good business plan.

9. MACRO IMPLICATIONS OF STUDY CONCLUSIONS

1. For Individual Farmers

Based on this Case Study and several other, it is possible to identify several general rules of thumb with regard to the feasibility of continuous crop winter wheat systems in the Dark Brown Soil Zone.

Generally speaking, it will not likely be possible to establish a feasible Business Plan regardless of market factors if any two of the following factors describe the individual farm situation:

- if there is less than 2,000 acres of good land per family unit, or
- if the yield target x expected price is less than $140/seeded acre, or
- if the ratio of debt to equity is over 20%, or
- if the creditor does not have up to date knowledge about conservation concerns and new cropping technology.

2. For Crops and Soils Researchers and Extension Specialists

Emphasis on production research and technology transfer of conservation cropping technology can be very dangerous for individual farmers and through logical consequences, very dangerous to Professionals in Agriculture as well.

For many years, the focus has been on identifying ways to improve production and input efficiency to the nearly total exclusion of studies on how to achieve financially successful adoption of the new technology on individual farms.

<u>This has been an unfortuate combination. A better balance is needed</u>.

END.